

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A vaporizer which vaporizes a liquid material under a depressurized atmosphere, the vaporizer comprising:

a liquid storing chamber temporarily storing the liquid material therein;

a vaporizing chamber set in the depressurized atmosphere;

a small aperture connecting between the liquid storing chamber and the vaporizing chamber so as to supply the liquid material to the vaporizing chamber;

a vaporization valve body located on a side of said small aperture away from said vaporizing chamber so as to open and close an inlet port of said small aperture, said inlet port being located toward the liquid storing chamber; and

an actuator independently controlling a degree of opening of the vaporization valve body,

wherein said vaporization valve body is located outside of said vaporizing chamber and on a side opposite to said vaporizing chamber with respect to said small aperture, said vaporization valve body being entirely located outside said vaporizing chamber so that said small aperture is continuously open to the vaporizing chamber, thereby permitting uninhibited flow of vapor of the liquid material achieving a smooth flow of vapor of the liquid in said vaporizing chamber, with communication between said liquid storing chamber and said vaporizing chamber independently controlled by said actuator that opens and closes an end of said small aperture opening adjacent to said vaporizing chamber.

2. (Original) The vaporizer as claimed in claim 1, further comprising carrier gas introducing means for introducing a carrier gas into the vaporizing chamber.

3. (Original) The vaporizer as claimed in claim 2, wherein the carrier gas introducing means injects the carrier in the vicinity of an outlet port of the small aperture.

4. (Previously Presented) The vaporizer as claimed in claim 3, wherein the carrier gas introducing means includes an injecting port positioned in the vicinity of the outlet port of the small aperture so as to inject the carrier gas from a surrounding area of the outlet port in a direction substantially perpendicular to a direction of a flow of the liquid material from said inlet port to said outlet port of said small aperture.

5. (Previously Presented) The vaporizer as claimed in claim 3, wherein the carrier gas introducing means includes an injecting port positioned in the vicinity of the outlet port of the small aperture so as to inject the carrier gas in a direction substantially opposite to a direction of a flow of the liquid material from said inlet port to said outlet port of said small aperture.

6. (Previously Presented) The vaporizer as claimed in claim 1, wherein the valve body is formed by one of a diaphragm and a bellows.

7. (Previously Presented) The vaporizer as claimed in claim 1, wherein the vaporizing chamber has a conical shape so that a cross section of the vaporizing chamber increases as a distance from the small aperture increases.

8. (Previously Presented) The vaporizer as claimed in claim 1, wherein a direction of a flow of the liquid material from said inlet port to said outlet port of said small aperture coincides with a direction of an exit of the vaporizing chamber.

9. (Previously Presented) The vaporizer as claimed in claim 1, further comprising a heater provided in a periphery of the vaporizing chamber and a temperature sensor detecting a temperature of the periphery of the vaporizing chamber.

10. (Previously Presented) The vaporizer as claimed in claim 1, further comprising a heater provided near the liquid storing chamber for heating the liquid material

in the liquid storing chamber and a temperature sensor positioned in the vicinity of an outlet port of the small aperture.

11. (Previously Presented) The vaporizer as claimed in claim 1, wherein the liquid material includes a metal complex used for depositing film in a process apparatus.

12. (Currently Amended) A semiconductor manufacturing system comprising:
a process apparatus performing a process using a vaporized material; and
a vaporizer which vaporizes a liquid material under a depressurized atmosphere so as to generate the vaporized material, the vaporizer comprising:
a liquid storing chamber temporarily storing the liquid material therein;
a vaporizing chamber set in a depressurized atmosphere;
a small aperture connecting between the liquid storing chamber and the vaporizing chamber so as to supply the liquid material to the vaporizing chamber;
a vaporization valve body located on a side of said small aperture away from said vaporizing chamber so as to open and close an inlet port of said small aperture, said inlet port being located toward the liquid storing chamber; and
an actuator independently controlling a degree of opening of the vaporization valve body,
wherein said vaporization valve body is located outside of said vaporizing chamber, and on a side opposite to said vaporizing chamber with respect to said small aperture, said vaporization valve body being entirely located outside said vaporizing chamber so that said small aperture is continuously open to the vaporizing chamber, thereby achieving a smooth flow of vapor of the liquid material in said vaporizing chamber, with communication between said liquid storing chamber and said vaporizing chamber independently controlled by said actuator that opens and closes an end of said small aperture opening adjacent to said vaporizing chamber.

13. (Previously Presented) The vaporizer as claimed in claim 1, wherein the vaporizing chamber has a conical shape so that a cross section of the vaporizing chamber increases as a distance from the small aperture increases, and a diameter of an exit end of said vaporizing chamber is equal to or greater than 12 mm.

14. (Previously Presented) The vaporizer as claimed in claim 1, wherein the vaporizing chamber has a conical shape so that a cross section of the vaporizing chamber increases as a distance from the small aperture increases, and a diameter of an exit end of said vaporizing chamber falls within a range from 12 mm to 20 mm.

15. (Previously Presented) The vaporizer as claimed in claim 1, wherein a diameter of said small aperture is equal to or less than 2 mm.

16. (Previously Presented) The vaporizer as claimed in claim 1, wherein a diameter of said small aperture falls within a range from 0.5 mm to 2 mm.

17. (Previously Presented) The vaporizer as claimed in claim 1, wherein a length of said small aperture is equal to or less than 5 mm.

18. (Previously Presented) The vaporizer as claimed in claim 1, wherein a distance between an outlet port of said small aperture and an exit end of said vaporizing chamber is equal to or greater than 12 mm.

19. (Previously Presented) The vaporizer as claimed in claim 1, wherein a distance between an outlet port or said small aperture and an exit end of said vaporizing chamber falls within a range from 12 mm to 20 mm.

20. (Previously Presented) The vaporizer as claimed in claim 1, wherein the vaporizing chamber has a conical shape so that a cross section of the vaporizing chamber

increases as a distance from the small aperture increases, and an axis of the conical shape of said vaporizing chamber coincides with a direction from the inlet port to an outlet port of said small aperture.

21. (Previously Presented) The vaporizer as claimed in claim 1, further comprising carrier gas introducing means for introducing a carrier gas into the vaporizing chamber, wherein the carrier gas introducing means injects the carrier gas in the vicinity of an outlet port of the small aperture, and a direction of injection of the carrier gas is different from a direction from the inlet port to the outlet port of said small aperture.

22. (Currently Amended) A vaporizer which vaporizes a liquid material under a depressurized atmosphere, the vaporizer comprising:

a liquid storing chamber temporarily storing the liquid material therein;

a vaporizing chamber set in the depressurized atmosphere;

a small aperture connecting between the liquid storing chamber and the vaporizing chamber so as to supply the liquid material to the vaporizing chamber;

a valve body located on a side of the liquid storing chamber with respect to said small aperture so as to open and close an inlet port of said small aperture which opens in the liquid storing chamber and also to control an amount of the liquid material being supplied to said vaporizing chamber by controlling a degree of opening of the inlet port of said small aperture; and

an actuator independently controlling a degree of opening of the valve body,

wherein the valve body is located on a side opposite to said vaporizing chamber with respect to said small aperture, said valve body being entirely located outside said vaporizing chamber so that said small aperture is continuously open to the vaporizing chamber, thereby permitting uninhibited flow of vapor of the liquid material achieving a smooth flow of vapor of the liquid material in said vaporizing chamber, with communication between said liquid storing chamber and said vaporizing chamber independently controlled by said actuator that opens and closes an end of said small aperture opening adjacent to said vaporizing chamber.

23. (Currently Amended) A semiconductor manufacturing system comprising:
a process apparatus performing a process using a vaporized material; and
a vaporizer which vaporizes a liquid material under a depressurized atmosphere so as to generate the vaporized material, the vaporizer comprising:
a liquid storing chamber temporarily storing the liquid material therein;
a vaporizing chamber set in a depressurized atmosphere;
a small aperture connecting between the liquid storing chamber and the vaporizing chamber so as to supply the liquid material to the vaporizing chamber;
a vaporization valve body located on a side of the liquid storing chamber with respect to said small aperture so as to open and close an inlet port of said small aperture which opens in the liquid storing chamber and also to control an amount of the liquid material being supplied to said vaporizing chamber by controlling a degree of opening of the inlet port of said small aperture; and
an actuator independently controlling a degree of opening of the vaporization valve body, wherein the vaporization valve body is located on a side opposite to said vaporizing chamber with respect to said small aperture, said vaporization valve body being entirely located outside said vaporizing chamber so that said small aperture is continuously open to the vaporizing chamber, thereby permitting uninhibited flow of vapor of the liquid material achieving a smooth flow of vapor of the liquid material in said vaporizing chamber, with communication between said liquid storing chamber and said vaporizing chamber independently controlled by said actuator that opens and closes an end of said small aperture opening adjacent to said vaporizing chamber.

24. (Previously Presented) A vaporizer which vaporizes a liquid material under a depressurized atmosphere, the vaporizer comprising:
a liquid storing chamber temporarily storing the liquid material therein;
a vaporizing chamber set in the depressurized atmosphere;
a small aperture connecting between the liquid storing chamber and the vaporizing chamber so as to supply the liquid material to the vaporizing chamber;

a vaporization valve body located on a side of the liquid storing chamber with respect to said small aperture so as to open and close an inlet port of said small aperture which opens in the liquid storing chamber; and

an actuator controlling a degree of opening of the valve body;

wherein said vaporizing chamber lacks obstacles including said vaporization valve body, thereby achieving a smooth flow of vapor of the liquid material in said vaporizing chamber.